REMARKS

In an Office Action dated May 15, 2006, the Examiner rejected claims 1-11, and 18-29 under 35 U.S.C. §102(b) as anticipated by S. Kaehler, "Fuzzy Logic", Parts 1-6 (herein *Kaehler*); and rejected claims 12 -17 under 35 U.S.C. 103(a) as unpatentable over *Kaehler* in view of Kamihira (US 6,276,986).[1]

Applicants have amended all independent claims to clarify the claimed invention. In particular, the claims have been amended to clarify that curve data is a plurality of data points representing a curve, and it is the curve (as opposed to individual data points) which is characterized by the fuzzy logic. As amended, the claims are patentable over the cited art.

A brief background discussion is in order to appreciate applicants' invention. Various control or analytical systems receive as input data from measurements of physical qualities, times, volumes, and so forth, and attempt to draw inferences from the data for feedback to a control mechanism or other purposes. For purposes of drawing inferences from the data, it is desirable to characterize a measurement as exhibiting some property or not. However, measurements in the real world often lie between idealized values representing some property, and therefore it can not be deduced with certainty whether the measurement has the property, or whether some action should be taken on that basis. Fuzzy Logic has been used to express a degree to which some property is present when the measured data is something other than an ideal value. In Fuzzy Logic terminology, it is said that the data is a member of a Fuzzy Set, membership being expressed as a degree rather than a binary (true or false) value.

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[1] The Examiner purported to reject dependent claims 13-16 under 35 U.S.C. 102(b), but apparently conceded that independent claim 12 from which they depend is not anticipated by *Kaehler*. Applicants therefore understand claims 13-16 to be rejected under 35 U.S.C. 103(a).

Conventionally, Fuzzy Logic has been used to determine the degree to which each individual data point of one or more data points is a member of a Fuzzy Set, and to act accordingly. I.e., an individual data point, such as a measured value taken at a particular time under particular conditions, is characterized by a Fuzzy Set membership function as having some property X to a given degree. However, applicants observed that there are some situations in which it is not the absolute data reading which is significant, but a trend in the data, particularly a trend over time. For example, the degree to which a sequence of measured values taken over a time interval has property X may be less significant than the fact that this degree is stable, or increasing/decreasing at some given rate.

Applicants observed that in these situations, it would be useful to be able to characterize trends in data ("curves") as having a property, analogous to the manner in which individual data points are characterized by conventional Fuzzy Logic. Specifically, instead of an individual data point, a set of data points forming a curve is compared with a standard curve representing a Fuzzy Set, an a degree of membership is determined for the curve.

To reiterate, conventional Fuzzy Logic determines a degree of membership of an ***individual data point*** in a Fuzzy Set expressing a property of an individual data point, for example: "air flow is high to a degree X". It is possible to determine a respective degree of membership separately for each of multiple data points, but this is merely repeating the process for an individual data point multiple times. In accordance with applicants' invention, a degree of membership of ***a curve (set of data points)*** in a Fuzzy Set is determined, the Fuzzy Set expressing a property of a curve, for example: "air flow is increasing inflected up to a degree X".

Applicants' representative claim 1, as amended, recites:

1. An apparatus, said apparatus comprising:

a controller, and

a curve matching mechanism that executes under the direction of said controller, said curve matching mechanism receiving curve data as an input, said curve data comprising a plurality of data points representing a curve, said curve matching mechanism *using Fuzzy Logic to describe said curve* represented by said curve data and to thereby create curve data description information, said curve data description information then being available to said controller. [emphasis added]

Independent claims 7, 12, 18 and 24, while not identical in scope, contain analogous limitations to the italicized language above.

Kaehler discloses a conventional fuzzy logic system in which membership of individual data points in a fuzzy set is determined and a degree of membership is assigned to each individual data point. *Kaehler* does not teach or suggest an ability to characterize a curve of data points. Specifically, *Kaehler* does not teach or suggest "... using Fuzzy Logic to describe ***said curve*** represented by said curve data...", as recited in applicants' claim 1.

The passages of *Kaehler* cited by the Examiner are a classic example of determining membership of an individual data point in a fuzzy set. A value called "error" and another value called "error-dot" are simple real numbers, and are compared with respective membership functions to determine respective degrees of membership in respective Fuzzy Sets. There is no teaching or suggestion whatsoever of a curve of multiple "error" or "error-dot" readings being compared with some standard curve, or in some other manner analyzed to determine a degree of membership in a Fuzzy Set which expresses a property of curves, such as "increasing", "constant", "decreasing", etc.

For the reasons stated, the claims as amended are not anticipated by *Kaehler*. Nor are the claims obvious over *Kaehler*, either alone or in combination with *Kamihira*. As noted above,

Kaehler is entirely conventional in disclosing membership functions for individual data points. There is no suggestion that *Kaehler* should be extended to determine Fuzzy Set memberships for curves of data points, as opposed to individual data points. *Kamihira* is cited to show a control feedback system for a machine, in particular a motor vehicle engine, but does not otherwise teach or suggest any of the recited Fuzzy Logic features of applicants' invention, and in particular does not teach or suggest the characterization of a curve of data points.

Applicants have added new independent claim 30, which recites in somewhat different terms the features of their invention. For the reasons stated above, neither *Kaehler* nor *Kamihira* teach or suggest "...determining membership of [an] input curve in at least one Fuzzy Set..." or "...outputting at least one respective input curve membership value representing degree of membership of said input curve in each said Fuzzy Set...", as recited in claim 30, and new claim 30 is accordingly patentable over the cited art.

In view of the foregoing, applicants submit that the claims are now in condition for allowance, and respectfully request reconsideration and allowance of all claims. In addition, the Examiner is encouraged to contact applicants' attorney by telephone if there are outstanding issues left to be resolved to place this case in condition for allowance.

Respectfully submitted,

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